WHAT IS CLAIMED IS:

1. A porous material comprising a plurality of columnar pores and an area surrounding the pores, the area being an amorphous area containing C, Si, Ge or a combination thereof.

2. A porous material according to claim 1, wherein the columnar pores are substantially unbranched.

3. A porous material according to claim 1, wherein the average interval between the centers of adjacent pores is 30 nm or less.

4. A porous material according to claim 1, wherein the average diameter of the columnar pores is 20 nm or less.

5. A porous material according to claim 1, wherein the plurality of pores have substantially the same depth direction.

6. A porous material according to claim 1, wherein the area contains aluminum.

7. A porous material according to any one of claims 1 to 6, wherein the porous material is formed

on a substrate and the depth directions of the columnar pores are substantially perpendicular to the substrate.

8. A porous material obtained by removing a first material from a structure comprising the first material and a second material, wherein the structure has columnar members containing the first material and surrounded by an amorphous area containing the second material and contains the second material in an amount of 20 to 70 atomic% based on the total amount of the first material and the second material.

9. A porous material according to claim 8, wherein the first material is aluminum.

10. A porous material according to claim 8, wherein the second material is Si, Ge, SiGe, C or a combination thereof.

11. A porous material according to claim 8, wherein the average interval between the centers of adjacent pores is 30 nm or less.

12. A porous material according to claim 8, wherein the diameter of the columnar pores is 20 nm or less.

13. A process for producing a porous material comprising the steps of:

preparing a structure which comprises a first material and a second material and has columnar members containing the first material and surrounded by an area containing the second material; and

removing the columnar members from the structure.

14. A process for producing a porous material according to claim 13, wherein the structure contains the second material in an amount of 20 to 70 atomic% based on the total amount of the first material and the second material.

15. A process for producing a porous material according to claim 14, wherein the first material contains aluminum.

16. A process for producing a porous material according to claim 14, wherein the second material contains C, Si, Ge, SiGe or a combination thereof.

17. A process for producing a porous material according to claim 13, wherein the structure is formed by using a process for forming a film under a non-equilibrium condition.

18. A process for producing a porous material according to claim 13, wherein the removing step is wet etching with an acid or alkali.

19. A process for producing a porous material according to claim 13, further comprising after the removing step the step of expanding the diameters of pores formed by the removing step.

20. A process for producing a porous material according to any one of claims 13 to 19, wherein the columnar members have a diameter of 20 nm or less and an average interval between their centers of 30 nm or less.

21. A process for producing a porous material comprising the steps of:

preparing a structure which comprises aluminum and silicon, has columnar members containing aluminum and a silicon area surrounding the columnar members, and contains silicon in an amount of 20 to 70 atomic% based on the total amount of aluminum and silicon; and

removing the columnar members from the structure.

22. A process for producing a porous material

according to claim 21, wherein the silicon area contains germanium.

23. A filter comprising the porous material of claim 1 or 8.

24. A mask material comprising the porous material of claim 1 or 8.